

XVIII. NETWORK SYNTHESIS

Prof. E. A. Guillemin
R. O. Duda

H. B. Lee
W. C. Schwab

A. ON THE ANALYSIS AND SYNTHESIS OF SINGLE-ELEMENT-KIND NETWORKS

As a result of comments from readers on a preprint with this title, which also appeared as a report in Quarterly Progress Report No. 56 (pages 213-235), the author has prepared comments to be inserted in this paper in the hope that several points will be clarified. Page numbers refer to pages in Quarterly Progress Report No. 56, and the figure mentioned below is reproduced for the convenience of readers.

Insert the following footnote to page 218 (referring to matrix 13):

This result can also be gotten from the well-known physical interpretation of what the elements in G represent.

Insert at the end of section 3, page 232:

In the given G matrix with all-positive elements, the arrangement of rows and columns may not be such as to give G the uniformly tapered form even though it is basically appropriate to a linear tree, since the branch numbering in that tree may not be consecutive. However, one can readily perceive the needed rearrangement of elements in the first row of G that yields a uniform taper from left to right, and thus the column and row interchanges in G that are needed to put it into uniformly tapered form are evident. This revised form of G must then yield positive branch conductance values according to the transformation 13 (with T given by matrix 7), if it is realizable at all.

Insert after paragraph 1, section 5, page 234:

When trivial variants in the tree structure exist, the following reasoning removes the pertinent ambiguities. For example, in Fig. XXV-8h there are two

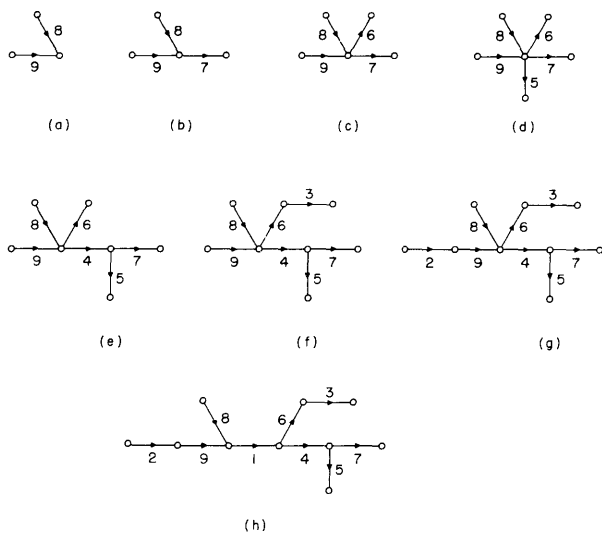


Fig. XXV-8. Growth of a tree according to the sign matrix given in Eq. 61. (Reproduced from Quarterly Progress Report No. 56, page 233.)

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trivial variants. Branches 3 and 6 can be interchanged and so can branches 2 and 9. If we leave them as they are, then in the G matrix appropriate to this tree, the familiar physical interpretation of what the elements in G stand for tells us that the element (13) must be less than the element (16); and the element (12) must be less than the element (19). These conditions can readily be checked; and if fulfilled, the G matrix must be realizable with the tree as it stands, if it is realizable at all. If either condition is not fulfilled, then we must consider the appropriate variant in the tree structure or else make the pertinent row-and-column interchange in G .

E. A. Guillemin